Regional Tree & Shade Summit 2.0:
Branching out One Community at a Time
A.E England Building, Phoenix, AZ
March 9, 2016

The Importance and Roles of Trees to Green Infrastructure

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The Importance and Roles of Trees to Green Infrastructure

- Changes: Latest Normal
- Drivers: National Differences
- Adapting: Messiness
Geologic timeline:

For centuries, atmospheric carbon dioxide had never been above this line.

Source: http://climate.nasa.gov/climate_resources/24/


Graphic: http://www.igbp.net/news/
Climate Change Impacts: Southwest Region | 5 Sectors

- Reduced Snowpacks & Streamflows
- Threats to Agriculture
- Increased Wildfire
- Heat Threats to Health
- Water & Temperature

Integrative Systems
Heat stress, a recurrent health problem for urban residents, has been the leading weather-related cause of death in the United States since 1986... and the highest rates nationally are found in Arizona.

2013 Assessment of Climate Change in Southwest United States: Chapter 15: Human Health: Coordinating Lead Authors: Heidi Brown (Univ. of AZ); Andrew C. Comrie (Univ. of AZ); Deborah M Dreschsler (CA Air Resources Board)
One Water Concept

- Renewable Water Supply: Surface River Water
- Groundwater
- Recharge

- Flood!
- Streets
- Groundwater
- Recharge
- Waste WaterUtility
- In Channel Recharge
- Reclaimed Water
- Roadways & Storm Drains
- Wastewater

Original Buckets of water Graphics:
Fernando Molina, Tucson Water;
modified for this presentation
Stormwater System Drivers

Combined Sewer System

Separated Sewer System

Connecting Water, UHI and Shade Trees: **Accepted Standards**

Curbs allowed by TDOT
Connecting Water, UHI and Shade Trees: Commercial RWH Ordinance

The Water Budget

Rainfall  
+ Plant H₂O Need  
+ Basin area needed  
= Minimum Required H₂O Volume for healthy plant survivability
Connecting Water, UHI and Shade Trees: TDOT APG Green Streets

TDOT: Houghton Road

TDOT: St. Mary’s Rd | Downtown Links
Metrics: Cost-Benefit Analysis

- **Traffic Calming - Roundabouts and Curb Extension**: 36%
- **Reduced Electricity Costs**: 10%
- **Reduced Flood Risk**: 6%
- **Reduced Heat Stress Mortality**: 3%
- **Value of Reduced CO2 Emissions**: 10%
- **Value of Reduced Air Pollution**: 9%
- **Reduced Marginal Social Costs of Water Use**: 12%
- **Reduced Direct Costs of Water**: 13%
- **Other Benefits**: 1%

**Other Benefits**

- **Traffic Calming**: Roundabouts and Curb Extensions 36%
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**GI/LID Practices Evaluated**

- 8 GI features evaluated

- Water Harvesting Basins
- Bio Retention Basin
- Xeriscape Swale
- Cistern
- Infiltration Trench
- Detention Basins (or Extended Detention Basin)
- Pervious Pavers
- Curb Extensions (chicanes, medians, traffic circles and road diets with inlets to collect stormwater)

**Silverbell Road**: Sustainable Return on Investment (AutoCase 2015)
The Cost of Maintenance

The Importance of Operation and Maintenance for the Long-Term Success of Green Infrastructure


Findings:
- Variability in tracking activities
- Trend toward accountability practices: developing O&M Manuals
- Very few tracking systems
- Trend to provide training or education
- Mix of public-private shared responsibility
- Mix of funding: general funds to stormwater utility fees
Integrative Practice of Green Infrastructure

Multiple Overlapping Elements

Multiple Interacting Players

- Public Health
- Natural/Urban Environment
- Urban Heat Island
- Economy
- Green Infrastructure
- Transportation
- Water Resources
Univ. of Arizona Water Resource Research Center newsletter article:
https://wrrc.arizona.edu/LID-green-infrastructure

Rainwater Harvesting Guidance Manual:

Green Infrastructure for Southwestern Neighborhoods:

Single-family Rainwater Harvesting Incentive Rebates:
http://www.tucsonaz.gov/water/rwh-rebate